Active Project (2015 - 2017)

# A Compact, Wide Area Surveillance 3D Imaging LIDAR Providing UAS Sense and Avoid Capabilities, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

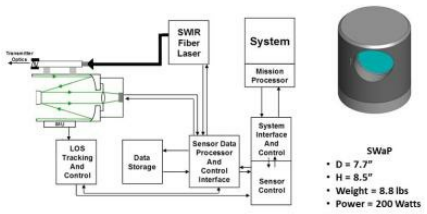
## ABSTRACT

The Phase II effort will complete the design of a flight prototype of an eye safe 3D LIDAR which, when deployed on Unmanned Ariel Systems (UAS), will detect aircraft flying near the UAS and enable timely avoidance maneuvers. The Active Continuous Awareness Surveillance System (ACASS) sensor detection range for small air vehicles is 5Km. ACASS searches a 30 degree elevation by 360 degree azimuth field of regard in 3Dimensions every 2 seconds. ACASS key components include a SWIR, fully eye safe, high pulse rate fiber laser, optical beam shaping and elevation steering elements, an advanced focal plane array with integrated readout electronics, a wide field of view receiver telescope, and mechanical elements for azimuth scanning. These elements will be developed, individually tested, and integrated into an Engineering Development Model which will demonstrate key functionalities required for a successful detect and avoid sensor system. Testing will be accomplished in both laboratory and ground environments. Test results will be used to update the final design of the flight prototype which will enable a rapid flight demonstration program.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: The Detect and Avoid capabilities of the proposed concept are directly applicable to the NASA desired use of autonomous UAS operating at high altitude for earth sciences missions (reference SBIR Topic S3.04). The simultaneous capabilities for high resolution 3D imagers from a wide area surveillance system can be exploited in several types of space operations such as a) docking where the fully eye safe feature of the laser being used in ACASS can eliminate human safety concerns for operations with the ISS or other manned platforms), b) landing operations on planets/asteroids/comets, and c) improving planetary surface

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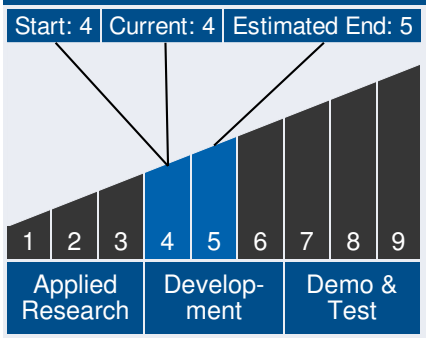
### Technology Maturity




### Management Team

**Program Executives:**

- Joseph Grant
- Laguduva Kubendran

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navigation providing detect and object avoid enhancements thru 3D imaging.

**To the commercial space industry:**

Potential Non-NASA Commercial Applications: Autonomous operations of Unmanned Ariel Systems (UAS) is the National Air Space is a recognized need across the spectrum of US, State, and Local government organizations for such needs as ariel system testing and development, crop surveys, surface mapping, border security, and police anti-crime operations. These needs extend directly into the civil and commercial sectors of the US economy. The wide area surveillance capability of ACASS is directly applicable to physical security of high value infrastructure such as power stations, transportation nodes, and commercial, civil, and military facilities. The ACASS systems 3D imaging capability enables real-time detection, classification, and alerting of potentially threatening activities near critical facilities. Its fully eye safe operation enables deployment in populated areas.

## Management Team *(cont.)*

**Program Manager:**
- Carlos Torrez

**Principal Investigator:**
- Medhat Azzazy

## Technology Areas

**Primary Technology Area:**
Science Instruments, Observatories, and Sensor Systems (TA 8)
- Remote Sensing Instruments and Sensors (TA 8.1)
  - Lasers (TA 8.1.5)
    - 3D Imaging Flash Light Detection and Ranging (LIDAR) (TA 8.1.5.4)

**Secondary Technology Area:**
Robotics and Autonomous Systems (TA 4)
- Sensing and Perception (TA 4.1)

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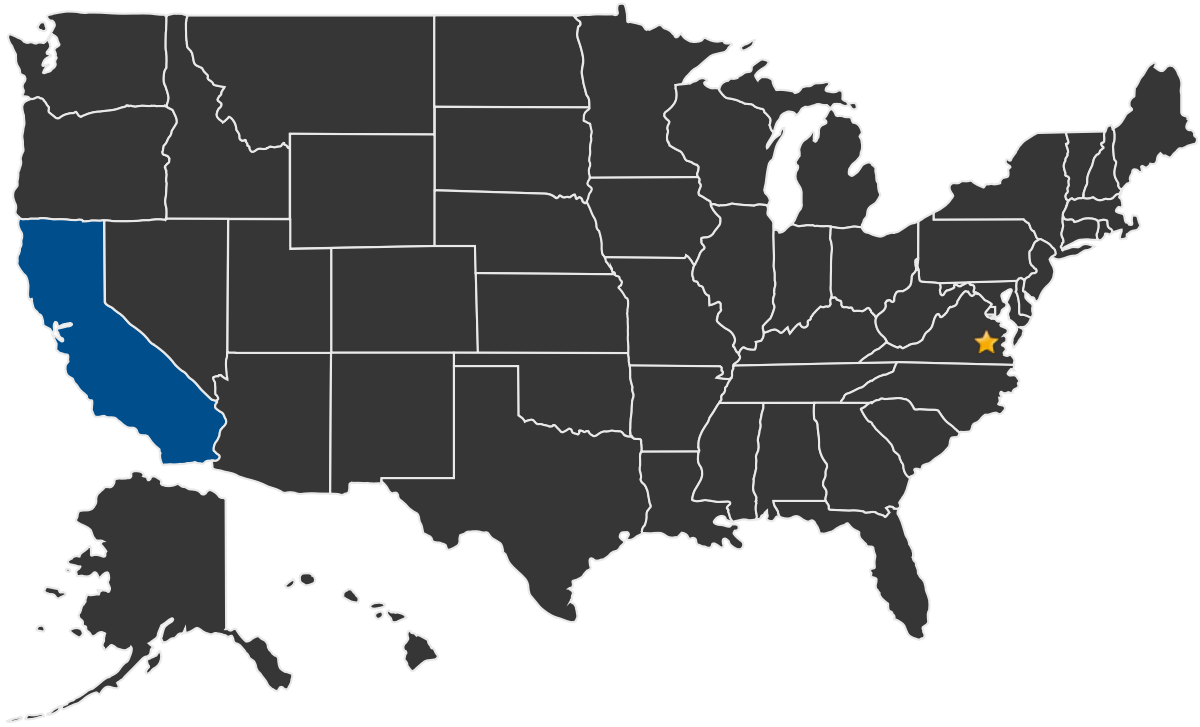
## U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

**Lead Center:**
Langley Research Center

**Other Organizations Performing Work:**

- Irvine Sensors Corporation (Costa Mesa, CA)

## PROJECT LIBRARY

**Presentations**

- Briefing Chart
  - (http://techport.nasa.gov:80/file/17781)

## DETAILS FOR TECHNOLOGY 1

### Technology Title

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